# AM radio / FM IF stereo system IC

## BA1442A

The BA1442A is an AM radio and FMIF stereo system IC developed for radio cassette players. The FM circuit is comprised of a differential IF amplifier, a double-balance type quadrature detector, and a PLL-type stereo MPX circuit. The AM circuit is comprised of a local oscillator circuit, a double-balance type mixer, an IF amplifier, a detector circuit, and an AGC circuit.

●Applications
Radio cassette players

●Features
1) The FM output "S" curve characteristic can be used for upper heterodyne (inverted "S") operation.
2) Audio high cut and low cut can be used to improve the AM fidelity.
3) A reference voltage supply is provided to ensure good frequency stability in the shortwave bands.
4) Good FM stability.
5) The "S" curve characteristic of the FM detector can be used for upper heterodyne ("N" curve) operation.
6) Built-in damping resistor (3.3kΩ) for the quadrature coil.
7) The FM MPX uses a Laser Locked Loop, making adjustment of the VCO and addition of external components unnecessary.
8) Built-in forced monaural function for the MPX (VCO stops, LED off).
9) VCO for the MPX switches off during AM operation.
10) The stereo indicator pin has a fixed drive current, and a current limiting resistor is not required.
11) Few external components required.

●Absolute maximum ratings (Ta = 25℃)

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | 9.0 | V |
| Power dissipation | Pd | 550*1 | mW |
| Operating temperature | Topr | −25~75 | ℃ |
| Storage temperature | Tstg | −55~125 | ℃ |

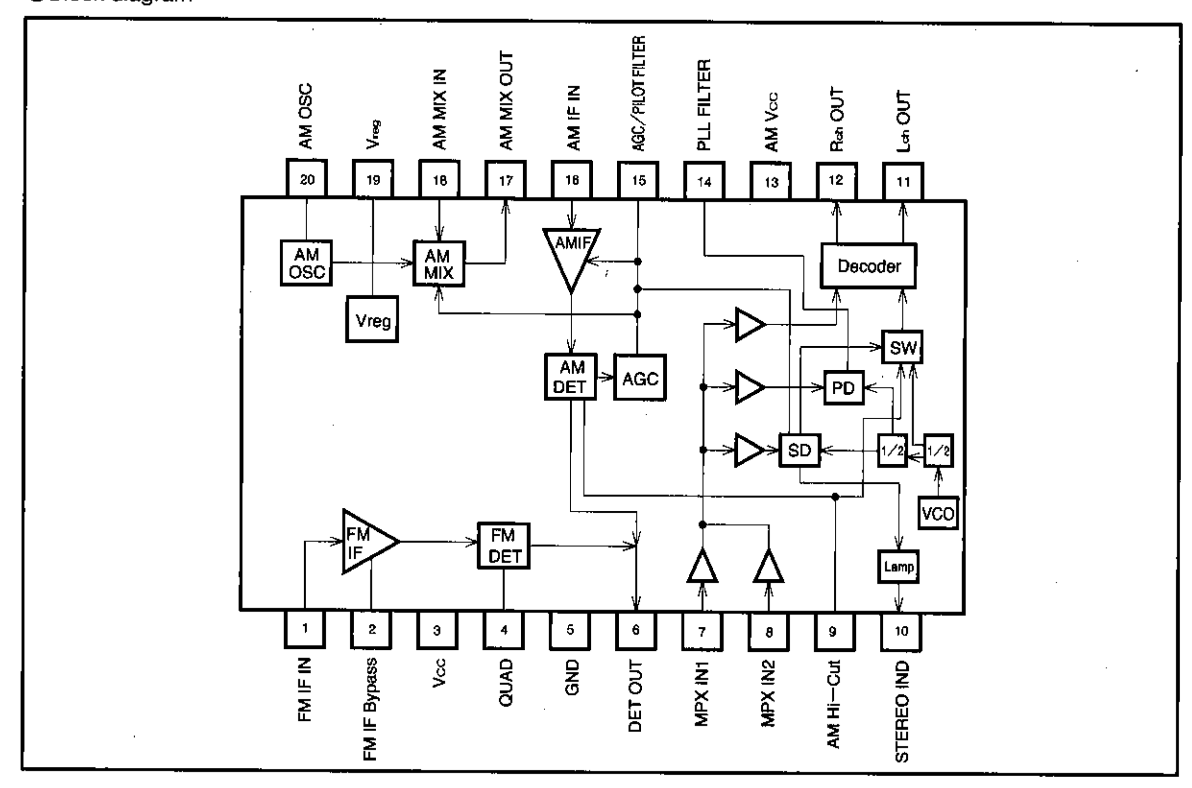
*1 Reduced by 5.5mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions (Ta = 25℃)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | 3.8~8.0*2 | V |

*2 For basic operation at Ta = 25°C.

## ●Block diagram




## ●Pin description

| Pin No. | Pin name | Function | Input/output circuit |
|---|---|---|---|
| 1 | FM IF input | Connected to an FM ceramic filter | Vcc ③, Vreg ⑲, 5kΩ, 330Ω, ①, GND ⑤, ② |
| 2 | FM IF bypass | Connected to a capacitor or pin 19 | |
| 3 | Vcc | | |
| 4 | FM discriminator | Connected to a phase shift coil | ④, Vcc ③, 3.3kΩ, 5pF, GND ⑤ |
| 5 | GND | | |

| Pin No. | Pin name | Function | Input/output circuit |
|---|---|---|---|
| 6 | AM/FM detect output | Connected to FM LPF and next-stage MPX | Vcc 3, Vreg 19, 6, 5kΩ, 3.3kΩ, GND 5 |
| 7 | MPX input | Input the FM detect output | Vcc 3, Vreg 19, 100kΩ, 20kΩ, 7, 8, GND 5 |
| 8 | MPX input | Input the detect output after AM low cut | |
| 9 | AM audio high cut Forced monaural | Connected to a capacitor. Forced monaural at 2.2V and above. | 9, AM Vcc 13, 8kΩ, GND 5 |
| 10 | Stereo indicator | Connected to an LED of other stereo indicator. Fixed drive current (10mA) | 10, Vcc 3, GND 5 |
| 11 | L channel output | Connected to following stage power amplifier | Vcc 3, 11, 12, 5kΩ, GND 5 |
| 12 | R channel output | Connected to following stage power amplifier | |
| 13 | AM power supply (band switch) | AM mode when power supply is connected | |

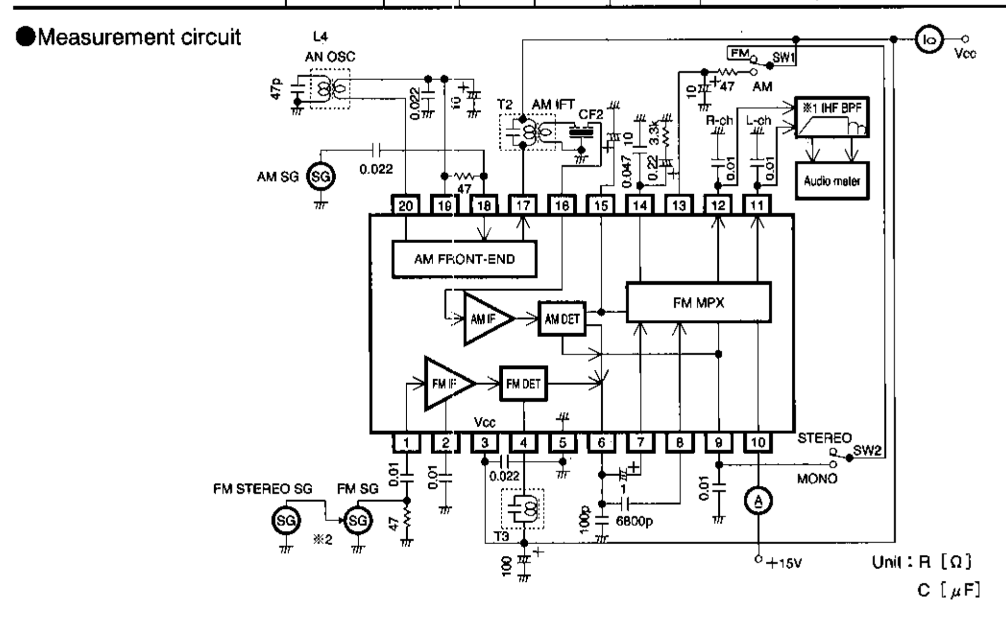
●Pin description

| Pin No. | Pin name | Function | Input/output circuit |
|---|---|---|---|
| 14 | PLL filter | Connect to a lag/lead filter | |
| 15 | AM AGC<br>Pilot filter | Connected to a capacitor | |
| 16 | AM IF input | Connected to AM ceramic filter | |
| 17 | AM mixer output | Connected to AM IF primary side | |
| 18 | AM antenna | Connected to AM antenna | |
| 19 | Reference voltage | Connected to a capacitor | |
| 20 | AM local oscillator | Connected to AM OSC circuit | |

●Electrical characteristics (Unless otherwise specified, Ta = 25℃, $V_{CC}$ = 5V,
FM IF MPX : fin = 10.7MHz, 400Hz modulation, 22.5kHz dev (30%), 19kHz 7.5kHz dev (10%)
AM : fin = 1000kHz, fm = 400Hz 30%)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions | Measurement Circuit |
|---|---|---|---|---|---|---|---|
| Circuit current 1 | $I_{CC1}$ | 9 | 13 | 18 | mA | FM mode, no input | |
| Circuit current 2 | $I_{CC2}$ | 9 | 13 | 18 | mA | AM mode, no input | |
| <FM IF MPX> | | | | | | | |
| Detector output voltage | Vo | 50 | 75 | 105 | mVrms | $V_{IN}$=100dB μV, mono | |
| -3dB limiting sensitivity | L.S | 26 | 30 | 34 | dB μV | mono | |
| Signal to noise ratio | S/N | 64 | 70 | — | dB | $V_{IN}$=100dB μV, mono | |
| Channel balance | C.B | −2 | 0 | +2 | dB | $V_{IN}$=100dB μV, mono | |
| AM rejection ratio | AMR | 30 | 40 | — | dB | AM : $V_{IN}$=60dB μV, mod=30%, 400Hz | |
| Channel separation | SEP | 32 | 45 | — | dB | $V_{IN}$=100dB μV, main | |
| Total harmonic distortion | THD | — | 0.1 | 0.8 | % | $V_{IN}$=100dB μV, main | |
| Stereo indicator current | $I_L$ | 8 | 10 | 12 | mA | $V_{IN}$=100dB μV, main | |
| <AM> | | | | | | | |
| Detector output voltage | $V_o$ | 50 | 75 | 105 | mVrms | $V_{IN}$=68dB μV | |
| Sensitivity | Q.S | 19 | 23 | 27 | dB μV | Input for an S/N of 20dB | |
| Signal to noise ratio | S/N | 44 | 52 | — | dB | $V_{IN}$=68dB μV | |
| Total harmonic distortion | THD | — | 0.8 | 2.0 | % | $V_{IN}$=68dB μV | |

●Measurement circuit




L4 : AM oscillation coil 2157-JPS-029 (SUMIDA ELECTRIC CO.,LTD)
T2 : AM IFT 2150-JPS-025 (SUMIDA ELECTRIC CO.,LTD)
T3 : FM discriminator coil 0236-JPS-101 (SUMIDA ELECTRIC CO.,LTD)
FC2 : AM ceramic filter FFD455-MB (TDK CORPORATION)
*1 IHF band-pass filter with built-in 0dB amplifier for 200Hz to 15kHz I/O.
*2 FM SG is modulated externally by FM MPX SG for the stereo signal.

●Technical reference materials (Unless otherwise specified, Ta = 25℃ and Vcc = 5V)

Note: The values given in the table below are representative values, and are not guaranteed.

| Parameter | Symbol | Typ. | Unit | Conditions |
|---|---|---|---|---|
| <FM IF> | | | | |
| IF input impedance | $Z_1$ | 330 | Ω | 1pin、f=10.7MHz |
| Quadrature impedance | $Z_4$ | 3.3 | kΩ | 4pin、f=10.7MHz |
| Detector output impedance | $Z_6$ | 5 | kΩ | 6pin、f=400Hz |
| <FM MPX> | | | | |
| Stereo indicator on sensitivity | $\Delta f$ | 2.8 | kHzdev | Degree of 19kHz modulation for $I_{10} \geqq$ 1mA |
| Stereo hysteresis | Hys | 2 | dB | 8pin、$f_{IN}$=19kHz、12.5mVrms |
| Capacitor charging | C.R | ±5.26 | % | 8pin、$f_{IN}$=19kHz、12.5mVrms |
| MPX input impedance | $Z_7$ | 20 | kΩ | 7pin、f=400Hz |
| MPX input impedance | $Z_8$ | 100 | kΩ | 8pin、f=400Hz |
| MPX output impedance | $Z_{11.12}$ | 5 | kΩ | 11,12pin、f=400Hz |
| 19kHz carrier leak | $C_{L19}$ | −30 | dB | De-emphasis = 50 μS |
| 38kHz carrier leak | $C_{L38}$ | −56 | dB | De-emphasis = 50 μS |
| Input/output voltage gain | $G_V$ | 6 | dB | 7pin、f=400Hz |
| <AM> | | | | |
| Total harmonic distortion | THD | 1.5 | % | $V_{IN}$=68dB μV、mod=80% |
| Mixer input impedance | $Z_{18}$ | 10 | kΩ | 18pin、f=1000kHz |
| Mixer output impedance | $Z_{17}$ | 100 | kΩ | 17pin、f=455kHz |
| IF input impedance | $Z_{16}$ | 3 | kΩ | 16pin、f=455kHz |

●Circuit operation

1) The FM IF amplifier is a three-stage differential amplifier. The gain of this stage is approximately 60dB. The bias for the first-stage amplifier is taken from the bypass filter (pin 2). This improves the FM stability of the first-stage amplifier by reducing noise. The input impedance is set by a resistor on the chip (330Ω), and can be connected to a ceramic filter.

2) The FM detector circuit is comprised of a quadrature detector. The IF amplified signal is input to the detector via a limiter amplifier with a gain of 13dB.

3) The AM mixer circuit is a double-balance type mixer, and has been designed for low local-oscillator leakage. The mixer input is via the antenna coil and has the $V_{REG}$ bias added to it. If you lower the mixer conversion gain for mid- to high-strength electric fields, AGC will operate, and for high-strength electric fields, the input shunt AGC gives good strong-input characteristics.

4) The AM local oscillator circuit consists of a differential positive feedback loop. To improve the frequency stability, particularly in the SW band, the circuit is operated with bias referenced to Vreg. To improve the startup characteristics, a 100Ω resistor is inserted in series with the tank circuit.

5) The AM IF amplifier consists of two-stage differential amplifier. Both amplifiers use capacitors to block DC, so bypass capacitors are not necessary. The first stage amplifier has AGC. The gain of this stage is 47dB, and the input impedance is 3kΩ.

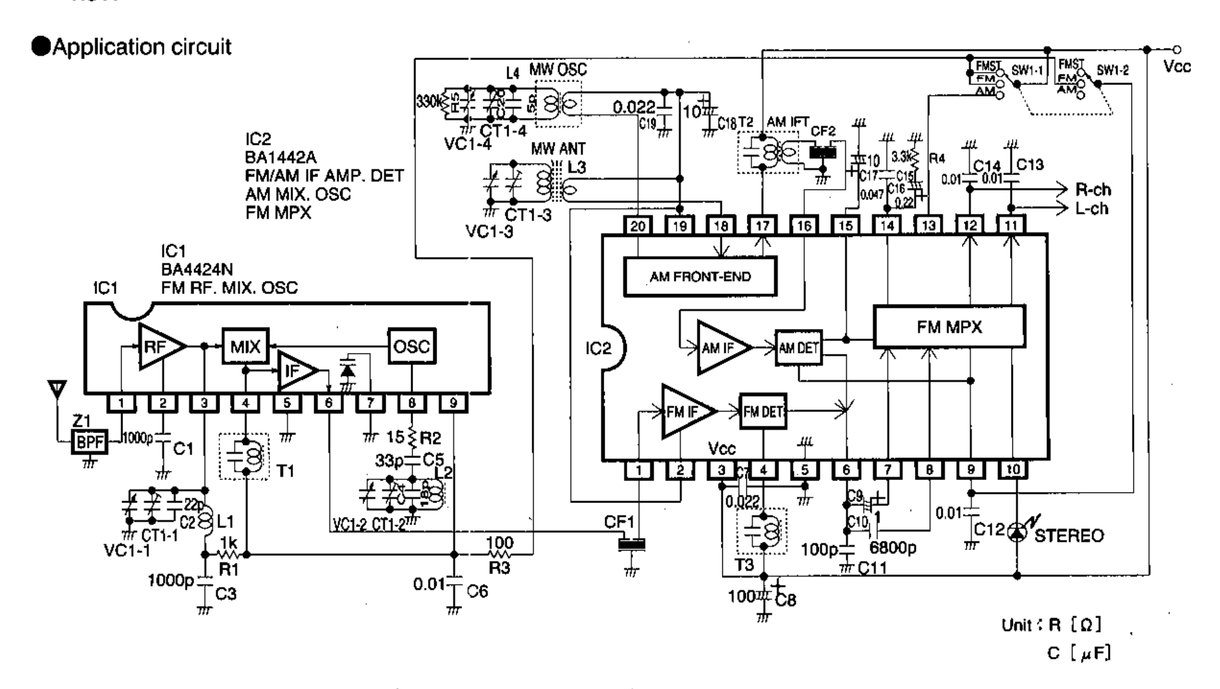
6) AM detector circuit
A built-in envelope detector that uses a minute current serves as the AM detector. External components are not required.

7) AM AGC circuit
AGC is applied to the input shunt, mixer, and IF circuits. The AGC reduces the mixer and IF circuit current, and according the DC level of the detector output, reduces the gain to control the output at a fixed level. In addition, an input shunt is provided to prevent distortion caused by strong input signals. The AGC pin is also used as the MPX PLL filter pin. For this reason, when there is no input, the AGC voltage becomes $V_{REG}$ (pin 19), and when there is a strong input signal, it is about $V_{REG}$ - 0.2V.

8) AM/FM detector circuits
There is one pin for both detector outputs (pin 6), and the AM / FM switching is done internally. The output impedance is 5kΩ, and the DC output is 1.3V.

9) The FM MPX circuit uses a PLL to recover the stereo. For FM, the input from pin 7 is switched by the decoder and output on pin 11 (L channel) and pin 12 (R channel). In the case of AM, the input is from pin 8, and this is output through to pins 11 and 12. The audio fidelity is improved by the low-pass filter comprised of the capacitor connected between pins 6 and 8 and the input impedance of pin 8 (20kΩ). The input/output gain for both AM and FM is about 6dB. The VCO has been laser trimmed on the chip to set its time constant. External components and re-adjustment are not required.

● Application circuit




| | | |
|---|---|---|
| Z1 | : FM band-pass filter | BPMB6A (SOSHIN ELECTRIC CO.,LTD.) |
| L1 | : FM RF coil | |
| L2 | : FM local oscillation coil | FEM10C-2F6 (SUMIDA ELECTRIC CO.,LTD.) |
| L3 | : MW bar antenna | |
| L4 | : MW local oscillation coil | 2157-JPS-029 (SUMIDA ELECTRIC CO.,LTD.) , A7BRS-12445X (TOKO,INC) |
| T1 | : FM IFT | 0236-JPS-101 (SUMIDA ELECTRIC CO.,LTD.) , A119ACS-19197N (TOKO,INC) |
| T2 | : AM IFT | 2150-JPS-025 (SUMIDA ELECTRIC CO.,LTD.) , A7MCS-12446X (TOKO,INC) |
| T3 | : FM discriminator coil | 0236-JPS-101 (SUMIDA ELECTRIC CO.,LTD.) , A119ACS-19197N (TOKO,INC) |
| CF1 | : FM ceramic filter | FFE1070MA11FBL (TDK CORPORATION) |
| CF2 | : AM ceramic filter | FFD455-MB (TDK CORPORATION) |
| VC | : Polivariable capacitor | VCB48E (ALPS ELECTRIC CO.,LTD.) |

●Frequency data

| Band | Frequency band | Nominal frequency | Tracking point | IF | Local oscillator frequency |
|---|---|---|---|---|---|
| MW | 520~1750kHz | 530~1710kHz | 600 , 1400kHz | 455kHz | Upper side |
| FM | 87~109.5MHz | 87.6~108MHz | (92) , 104MHz | 10.7MHz | Upper side |

●Component data

| Part No. | Name | Code/manufacturer | Remarks |
|---|---|---|---|
| Z1 | Band-pass filter | BPMB6A<br>Soshin Electric Co., Ltd. | 88~108MHz<br>$Z_{IN}$=75Ω、$Z_{OUT}$=75Ω |
| L1 | FM RF coil | | Printed coil |
| L2 | FM OSC coil | FEM10C-2F6<br>Sumida Electric Co., Ltd. | ③ ①<br>①−③ 2 $\frac{1}{2}$T<br>Wire type: φ0.6UEW<br>No load Q = 115 |
| L3 | MW bar antenna | | Vc ① S, LT, GND ④, S ③ IC, LB, ② Vreg<br>①−④ 94T<br>②−③ 16T<br>LT LB<br>Core: φ10 x 60mm (material: NIL)<br>④ Clear ① Red ② Blue ③ Yellow<br>Wire type: UDATC 5/0.07<br>Winding method: solenoid<br>Inductance (1 - 4) = 554 μH<br>Distributed capacitance = 5.5pF (max.)<br>Q=310±100 (500kHz) 、280±100 (1000kHz) |
| L4 | MW OSC coil | 2157−JPS−029<br>Sumida Electric Co., Ltd.<br>A7BRS-12445X<br>Toko Co., Ltd. | VC ③, ②, GND ① S, ④ IC, S, ⑥ Vreg<br>①−③ 100T<br>④−⑥ 9T<br>Wire type: φ0.6UEW<br>Inductance = 256μH±6% min., variable (796kHz)<br>No load Q = 90min. (796kHz)<br>Distributed capacitance (1 - 3)= 7.5pF (max.) |

Tuner systems

High-frequency signal processors

| Part No. | Name | Code/manufacturer | Remarks |
|---|---|---|---|
| T1 | FM IFT | 0236−JPS−101<br>Sumida Electric Co., Ltd.<br>A119ACS-19197N<br>Toko Co., Ltd. | Vcc ③ ④ ② S S IC ① S ⑥<br>①−② 8T<br>②−③ 5T<br>④−⑥ 3T<br>Wire type: ϕ 0.10MUEW<br>Tuning frequency = 10.7MHz±3% min., variable<br>No load Q = 60 min. (10.7MHz)<br>Primary power supply impedance (1 - 3) = 14.6kΩ (10.7MHz)<br>Secondary power supply impedance (4 - 6) =408Ω (10.7MHz) |
| T2 | AM IFT | 2150−JPS−025<br>Sumida Electric Co., Ltd.<br>A7MCS-12446X<br>Toko Co., Ltd. | IC ③ ④ GND ② S Vcc ① S ⑥ CF<br>①−③ 117T<br>④−⑥ 6T<br>Wire type: ϕ 0.6UEW<br>Tuning frequency = 455kHz±4% min., variable<br>No load Q = 60 min. (455kHz)<br>Tuning capacitance = 430pF±10% |
| T3 | FM detector coil | 0236−JPS−101<br>Sumida Electric Co., Ltd.<br>A119ACS-19197N<br>Toko Co., Ltd. | Vcc ③ ④ ② S S IC ① S ⑥<br>①−② 8T<br>②−③ 5T<br>④−⑥ 3T<br>Wire type: ϕ 0.10MUEW<br>Tuning frequency = 10.7MHz±3% min., variable<br>No load Q = 60 min. (10.7MHz)<br>Primary power supply impedance (1 - 3) = 14.6kΩ (10.7MHz)<br>Secondary power supply impedance (4 - 6) = 408Ω (10.7MHz) |
| CF1 | FM ceramic filter | FFE1070MA11FBL<br>TDK Co., Ltd. | 3dB bandwidth = 280kHz±50kHz<br>Input loss = 6.0 (2.7) dB Max. |
| CF2 | AM ceramic filter | FFD455−MB<br>TDK Co., Ltd. | 3dB bandwidth = 10kHz±3kHz<br>Input loss = 5.0 (2.5) dB Max. |
| VC | Polivariable capacitor | VCB48E<br>Alps Co., Ltd. | Stages / Max. variable capacitance / Min. capacitance / Allowable capacitance difference<br>AM−2 / (O) 82pF (A) 160pF / 3.7$^{+0.5}_{-1}$pF / ± (1pF+2%)<br>FM−2 / 20×2 / 3.1$^{+0.5}_{-1}$pF / ± (0.4pF+2%) |

●Selection of external components

Pin 1 : FM ceramic filter (CF1)

The input impedance of pin 1 is 330Ω, so it should be connected to a ceramic filter that has an output impedance of 330Ω. Connect the earth point of the ceramic filter to the input side GND. In addition, the connection distance between the ceramic filter and pin 1 should be as short as possible.

Pin 2 : FM IF bypass

This pin is used to ensure stable FM, and it is normally connected to pin 19 (Vreg). If it is not possible to achieve stable FM, ground pin 2 via a 0.01 μF capacitor. The earth point in this case will be on the GND side of the FM ceramic filter.

Pin 3 : Power supply bypass capacitors ($C_7$ and $C_8$)

$C_7$ should be a capacitor with good high-frequency characteristics. Connect it between the base of the legs of pin 3 ($V_{CC}$) and pin 5 (GND). The purpose of $C_8$ is ripple prevention, and it can be connected a little further away.

Pin 4 : FM quadrature detector phase-shift coil (T3)

A Pins 3 and 4 are connected internally by a 3.3kΩ damping resistor. The earth point for the phase-shift coil should be $V_{CC}$, so ensure that it is at the same voltage as pin 3 ($V_{CC}$).

Pin 6 : FM detector low-pass filter capacitor ($C_{11}$)

This capacitor smooths the 2 × 10.7MHz (21.4MHz) signal generated by FM quadrature detection, and prevents leakage of the 10.7MHz signal. The output impedance of pin 6 (5kΩ) and $C_{11}$ form a low-pass filter. Connect the earth point to a GND other than the input side GND. If you do not do this, the input carrier will return from the output, and may result in poor stability. If the capacitor is too large, poor separation will result.

Pin 7 : FM detector output coupling capacitor ($C_9$)

Input for the FM detector output to the MPX. The input impedance of pin 7 (100kΩ) and $C_9$ form a high-pass filter. If the value of $C_9$ is too low, poor bass region separation will result.

Pin 8 : AM detector output coupling capacitor ($C_{10}$)

Input for the AM detector output to the MPX. The input impedance of pin 8 (20kΩ) and $C_{10}$ form a high-pass filter and improves the AM fidelity. Characteristic curves for different values of $C_{10}$ are given in the graph in Fig. 1.

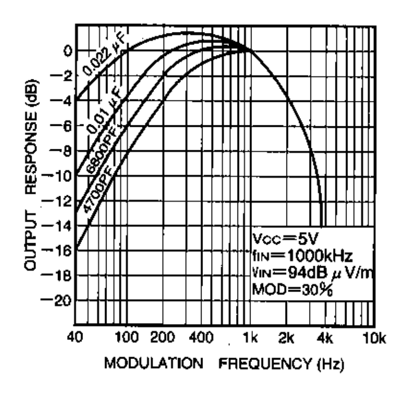



Fig. 1 AM fidelity characteristics

Pin 9 : AM high-cut capacitor ($C_{12}$)

The input impedance of pin 9 (8kΩ) and $C_{12}$ form a low-pass filter. To prevent beat from occurring between carrier leak from the detector output pin and the input signal, connect a capacitor of about 1000pF, even if not using high-cut. Connect the earth point to a GND other than the input side GND. Characteristic curves for different values of C12 are given in the graph in Fig. 2.

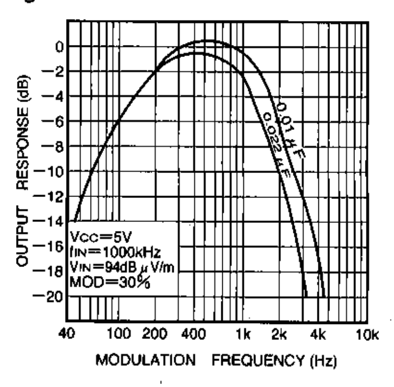



Fig. 2 AM fidelity characteristics

Pin 9 : Forced monaural (SW1)
If the voltage on pin 9 goes to 2.2V or higher in FM mode, forced monaural operation starts (VCO stops, the stereo indicator goes off, and audio output goes monaural). Do not apply a voltage to pin 9 that is higher than the voltage on pin 3 (Vcc). Also, when in AM mode, the AM detector output is output on pin 9, so use a switch to switch pin 9 open circuit in AM mode, as shown in the application circuit example. If you change the voltage on pin 9 during AM operation, the AGC characteristics will be disturbed.

Pin 10 : Stereo indicator
The pin 10 current is fixed at 10mA, so an external current-limiting resistor is not required. If you wish to reduce the brightness of the LED, connect a resistor in parallel to reduce the current. If you do not wish to use stereo indication, connect pin 10 directly to the power supply, however, the current consumption is that same as that when stereo indication is used. The withstanding voltage of pin 10 is 9V, so use caution when connecting it to power sources other than the IC power supply.

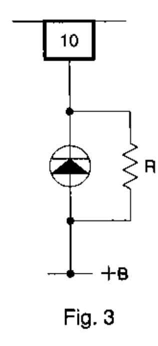


Fig. 3

Pins 11 and 12
De-emphasis capacitors ($C_{11}$ and $C_{12}$)
The output impedance of pins 11 and 12 (5kΩ), and $C_{11}$ and $C_{12}$ set the de-emphasis time constant (50 μ sec. for 0.01 μF, and 75usec. for 0.015 μF). Do not connect $C_{11}$ and $C_{12}$ if composite (voice multiplex etc.) signal processing will be performed at the following stage.

Pin 13 : AM/FM switching noise reduction filter
Pin 13 is the AM power supply pin. When power is applied, the circuit is in AM mode. By setting a CR time constant, it is possible to reduce the audible switching noise that occurs when switching between AM and FM. Choose the resistor so that the voltage drop across the resistor is 0.5V max. with respect to the pin 3 (Vcc). Do not apply a voltage higher than the voltage on pin 3 (Vcc) to pin 13.

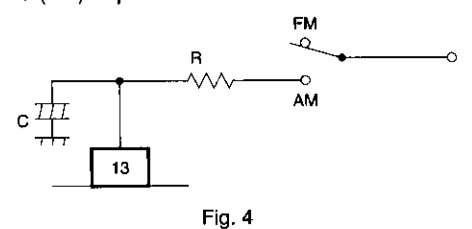


Fig. 4

Pin 14 : PLL filter ($C_{15}$, $C_{16}$, and $R_4$)
PLL loop filter for the MPX. Varying the values of these components changes the capture range of the PLL, but can also result in PLL beat, or the PLL going out of lock due to temperature changes, so do not change these component values.

Pin 15 : Pilot filter and AGC filter ($C_{17}$)
Pin 15 is used by both the MPX pilot filter and the AM AGC filter. Lower values for $C_{17}$ will result in increased THD for bass-region AM audio, and larger values will increase the time required to switch between monaural and stereo for FM. Characteristic curves for various values of $C_{17}$ are given in Figs. 5 to 7.

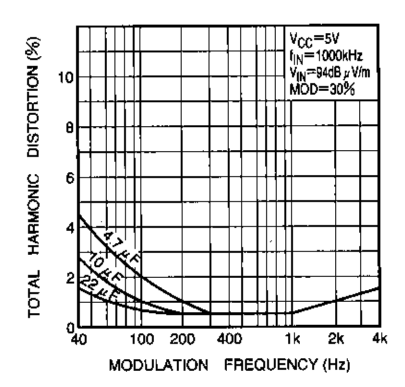


Fig. 5 Fidelity characteristics
(30% modulation)

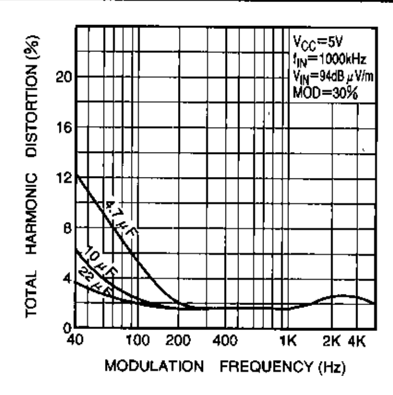



Fig. 6 Fidelity characteristics (30% modulation)

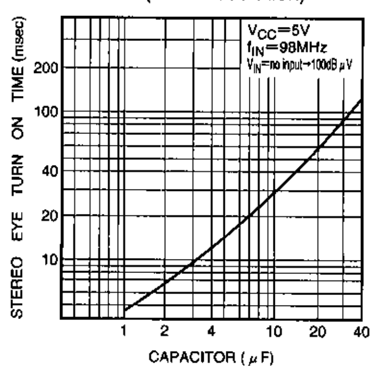



Fig. 7 Stereo eye turn on time vs. capacitor value

●Selection of external components

Pin 16 : AM ceramic filter ($CF_2$)

The input impedance of pin 16 is 3kΩ, so it should be connected to a ceramic filter that has an output impedance of 3kΩ. The connection distance between the ceramic filter and pin 16 should be as short as possible.

Pin 17 : AM IFT (T2)

The output impedance of pin 17 is 100kΩ. The IFT earth point is $V_{CC}$; make the voltage at pin 17 the same as the pin 3 ($V_{CC}$) potential. The connection distance between the IFT and pin 17 should be as short as possible.

Pin 18 : AM antenna (L3)

The input impedance of pin 18 is 10kΩ. The AM antenna earth point is Vreg; make the voltage at pin 18 the same as the pin 19 (Vreg) potential. If there is a voltage drop, local oscillator leakage to the mixer output will increase.

Pin 19 : Reference power supply bypass capacitors ($C_{18}$ and $C_{19}$)

Connect the low-frequency bypass capacitor ($C_{18}$) and the high-frequency bypass capacitor ($C_{19}$).

Pin 20 : AM oscillator coil (L4)

To improve the startup oscillation characteristics, a 100Ω resistor (built-in) is connected in series with the coil. If the shortwave oscillation startup characteristics are poor, connect an additional resistor (47Ω to 100Ω) in series with the coil. Make the earth point for the oscillator coil pin 19 (Vreg). The relationship between the S / N ratio and sensitivity at 20dB S / N against pin 20 oscillation voltage is shown in Fig. 9.

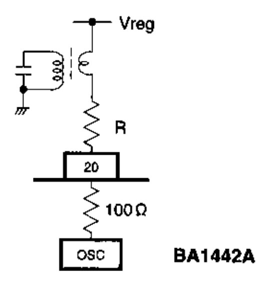



Fig. 8

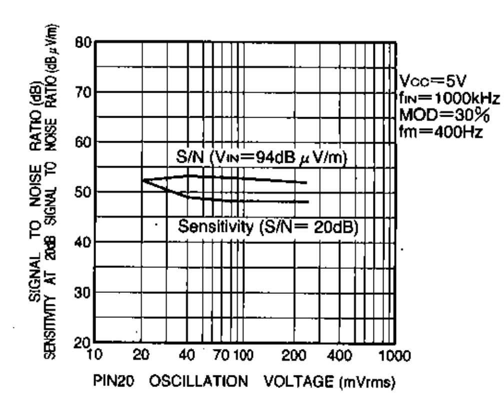



Fig. 9 S/N ratio and sensitivity at 20dB S/N vs. pin 20 oscillation voltage

Pin 6 : AFC circuit

It is possible to use the pin 6 detector output DC voltage and apply AFC. Select between the BA1442A and BA1443A depending on the orientation of the local oscillator. Fig. 10 shows an application example where the BA4424N is used as the FM front end. Use the BA1442A in the case of upper heterodyne, and the BA1443A in the case of lower heterodyne.

Even if you will not use AFC, when recovering the subcarrier phase-modulated composite signal (voice-multiplexed TV) in the next stage, match the oscillator and "S" curve orientations in the same way as described above. If they are reversed, the left and right channels of the recovered audio will be reversed.

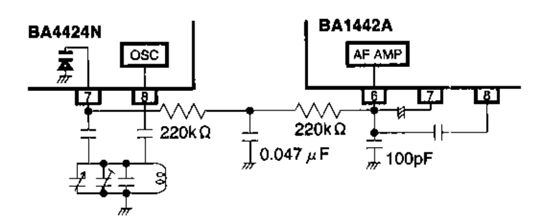



Fig. 10

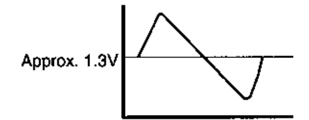



Fig. 11 BA1442A

●Quiescent pin voltages (Vcc = 5V)

| Pin | FM | AM |
|---|---|---|
| 1 | 2.1 | 2.1 |
| 2 | 2.1 | 2.1 |
| 3 | 5.0 | 5.0 |
| 4 | 5.0 | 5.0 |
| 5 | 0 | 0 |
| 6 | 1.3 | 1.3 |
| 7 | 2.1 | 2.1 |
| 8 | 2.1 | 2.1 |
| 9 | 2.1 | 2.1 |
| 10 | — | — |
| 11 | 1.5 | 1.5 |
| 12 | 1.5 | 1.5 |
| 13 | 1.2 | 4.85 |
| 14 | 2.1 | 2.1 |
| 15 | 2.1 | 2.0 |
| 16 | 1.2 | 4.85 |
| 17 | 5.0 | 5.0 |
| 18 | 2.1 | 2.1 |
| 19 | 2.1 | 2.1 |
| 20 | 2.1 | 2.1 |

(Units: V)

●Measurement data

MW characteristics

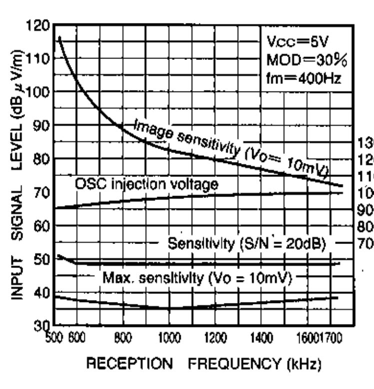



Fig. 12 Tracking characteristics

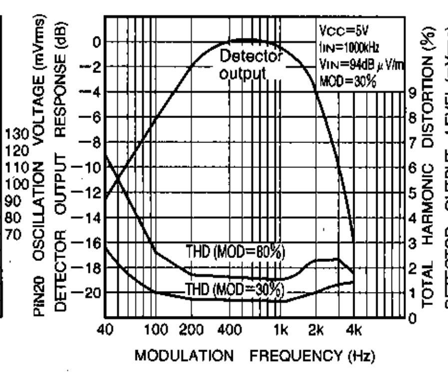



Fig. 13 Fidelity characteristics

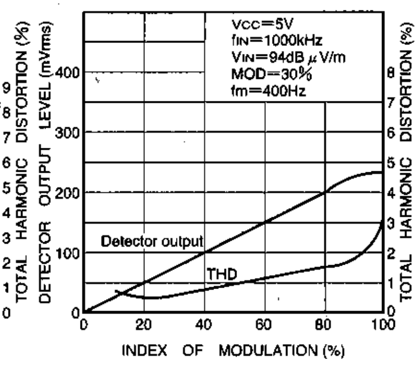



Fig. 14 Modulation characteristics

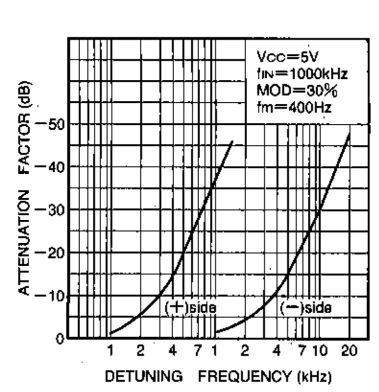



Fig. 15 Selectivity characteristics

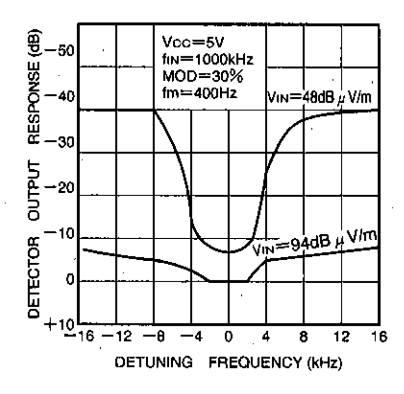



Fig. 16 Detuning characteristics

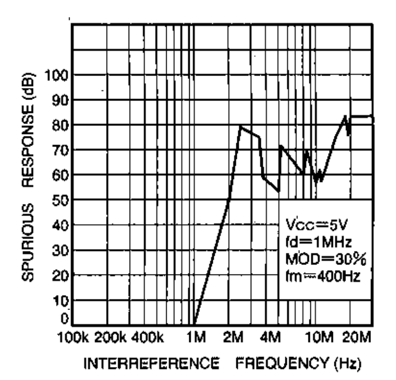



Fig. 17 Spurious response characteristics

●Measurement data

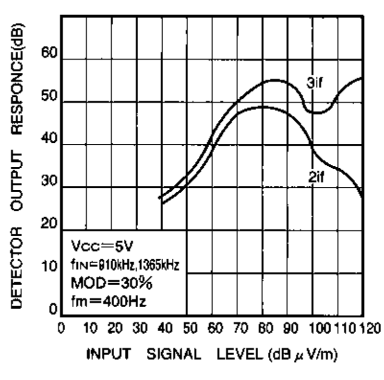



Fig. 18 Beat characteristics

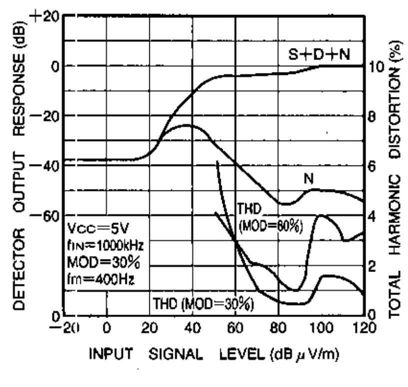



Fig. 19 Sensitivity characteristics

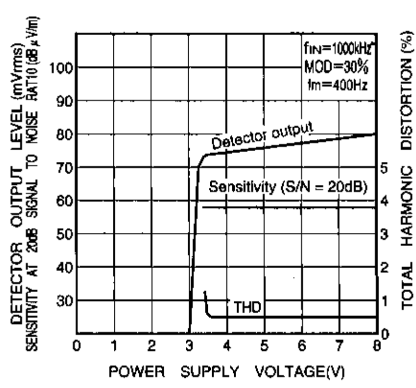



Fig. 20 Power supply characteristics

FM characteristics

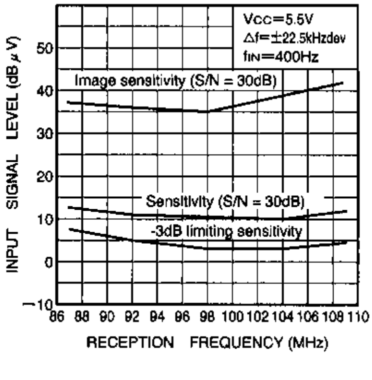



Fig. 21 Tracking characteristics

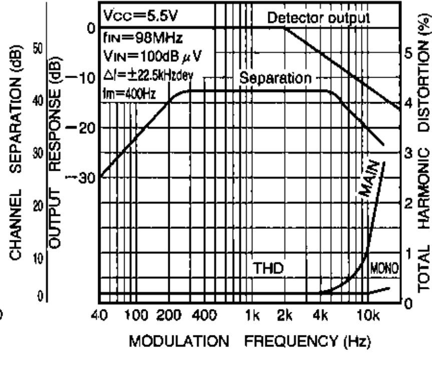



Fig. 22 Fidelity characteristics

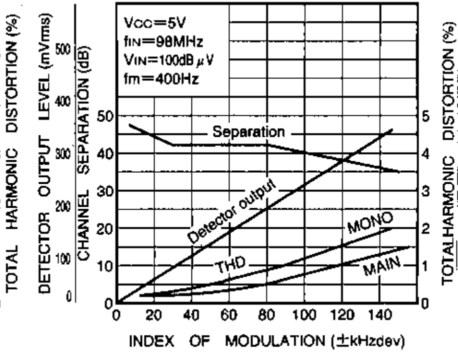
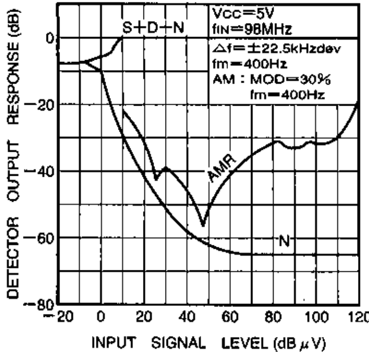
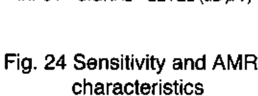



Fig. 23 Modulation characteristics





Fig. 24 Sensitivity and AMR characteristics

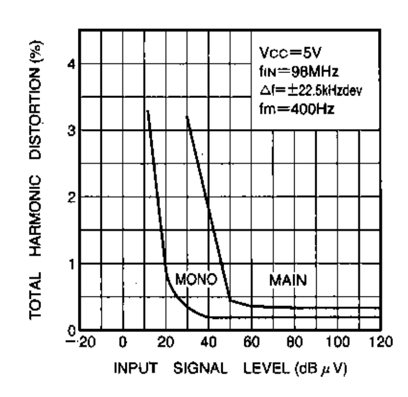



Fig. 25 Sensitivity characteristics

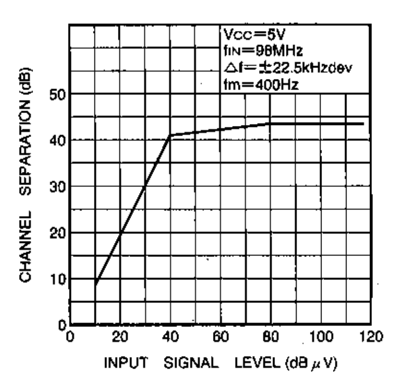



Fig. 26 Sensitivity characteristics

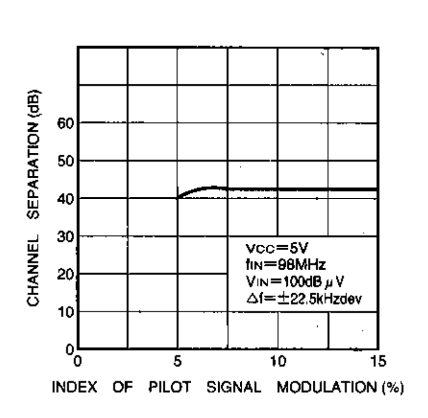


Fig. 27 Pilot fluctuation characteristics

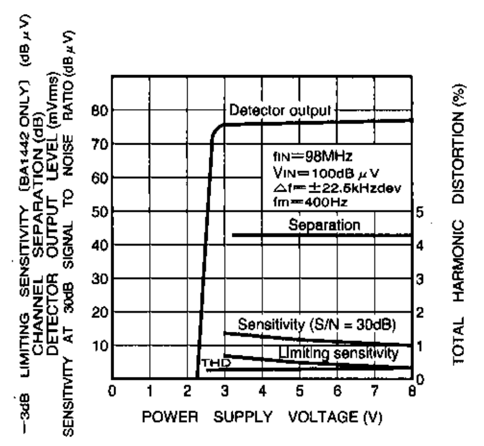
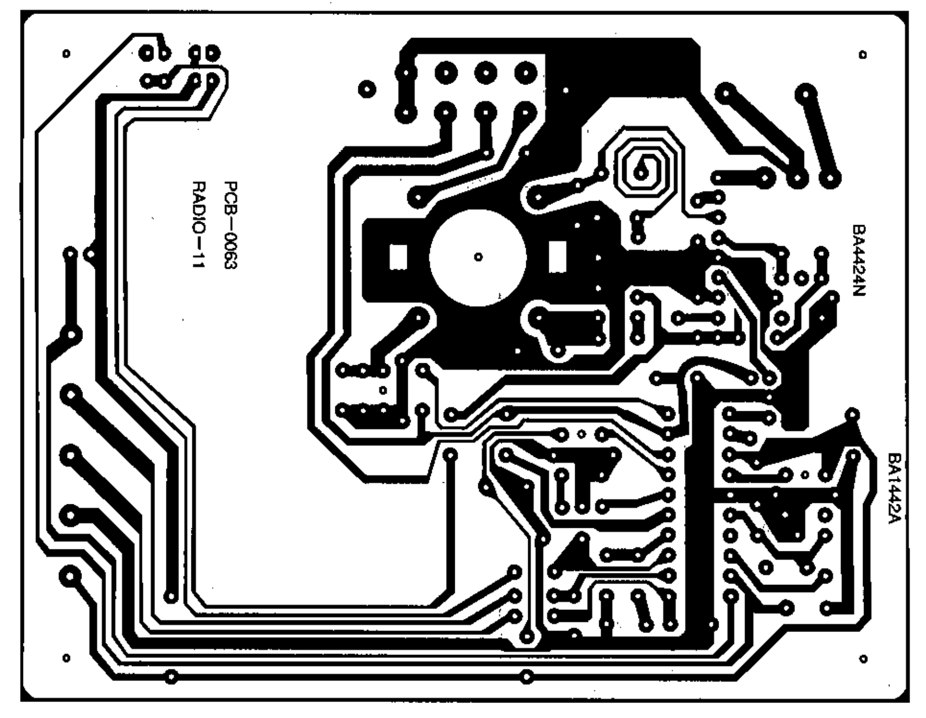


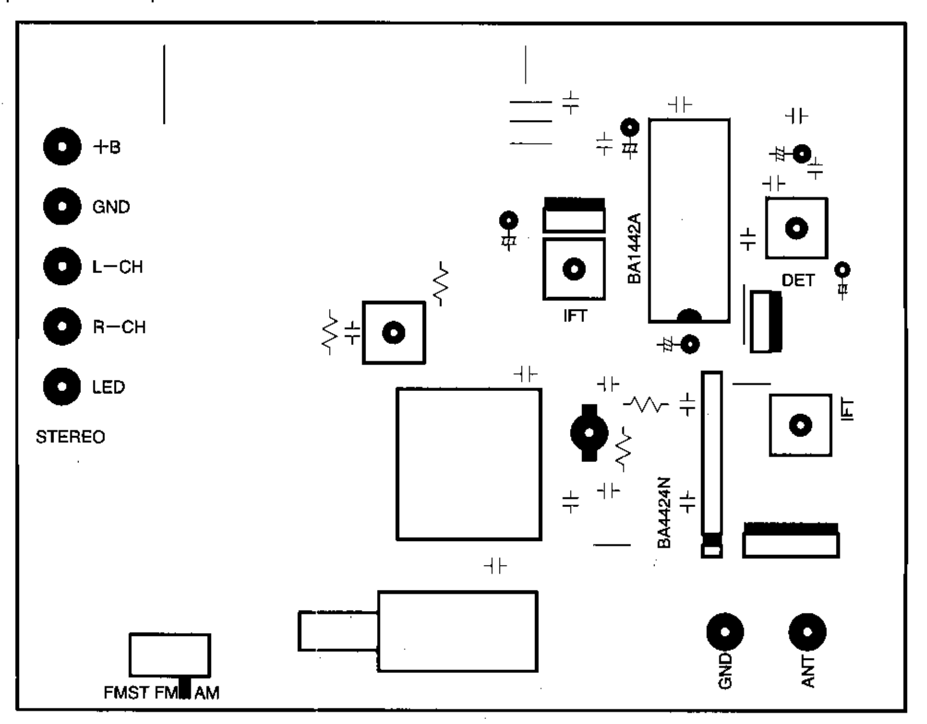
Fig. 28 Power supply voltage characteristics

●PCB for application example circuit



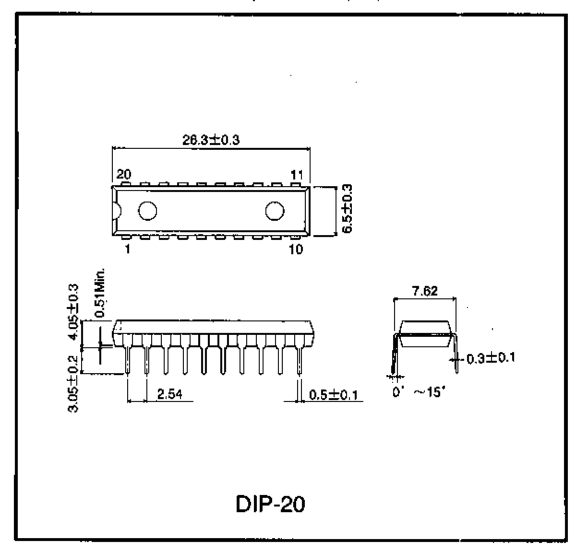
Solder side

●PCB for application example circuit




Component side

●External dimensions (Unit: mm)




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